

In the Claims

1. (Currently Amended): A controller for controlling a multi-variable input system having a plurality of manipulatable variables (MVs) as inputs, and operable to provide a plurality of measurable outputs and at least one unmeasurable output, which unmeasurable output can not be measured in substantially real time and requires external analysis for the determination of parameters thereof, comprising:

a system predictive model that provides a model of the dynamics of selected aspects of the operation of the system for modeling the dynamics thereof and providing at least one predicted output for at least a select one of the measurable outputs;

an external predictive model for receiving an external analysis of at least one parameter of the unmeasurable output and a desired unmeasurable output value for that at least one parameter, and ~~the external predictive model operable to predicting as a predicted control value the dynamic[[s]] response of a select one of the measurable outputs as a function of the at least one parameter and the desired unmeasurable output value for the at least one parameter to predict the dynamics as a desired value of the select one of the measurable outputs required to achieve the a desired value of the at least one unmeasurable output value;~~

an optimizer for receiving desired values for the selected aspects of the operation of the system modeled by said system predictive model and said predicted outputs from said system predictive model ~~in addition to the desired value of the select one of the measurable outputs generated by said external predictive model and optimizing the inputs to the predictive model to minimize error between the predicted and desired values; and~~

a control input device for applying the predicted control value to the system and the optimized input values to the system after optimization thereof, wherein a change in the select one of the unmeasurable outputs is not accounted for in the control input device.

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2. (Previously Presented): The controller of Claim 1, wherein said optimizer is further operable to receive constraints on said input values such that the optimization operation changes the inputs within said constraints when minimizing the error between the predicted and desired values.

3. (Previously Presented): The controller of Claim 1, wherein the system is subject to at least one disturbance variable that alters the operation of the system and wherein said predictive model will predict the behavior of the selected aspects modeled thereby in response to changes in the at least one disturbance variable and said optimizer will change the inputs to again minimize the error between the
5 predicted and desired values.

4. (Currently Amended): A method for controlling a multi-variable input system having a plurality of manipulatable variables (MVs) as inputs, and operable to provide a plurality of measurable outputs and at least one unmeasurable output, which unmeasurable output can not be measured in substantially real time and requires external analysis for the determination of parameters
5 thereof, comprising the steps of:

providing a system predictive model that provides a model of the dynamics of selected aspects of the operation of the system for modeling the dynamics thereof and providing at least one predicted output for at least a select one of the measurable outputs;

providing an external predictive model for receiving an external analysis of the at least
10 one parameter of the unmeasurable output and a desired unmeasurable output value for that at least one parameter, and the external predictive model operable to predicting as a predicted control value the dynamic[[s]] response of a select one of the measurable outputs as a function of the at least one unmeasurable output parameter and the desired value for that at least one parameter to predict the dynamics as a desired value of the select one of the measurable outputs required to achieve the a
15 desired value of the at least one unmeasurable output value;

receiving in an optimizer desired values for the selected aspects of the operation of the system modeled by the predictive model and the predicted outputs from the predictive model in

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addition to the desired value of the select one of the measurable outputs generated by the external predictive model and optimizing the inputs to the predictive model to minimize error between the predicted and desired values; and

5 applying the predicted control value to the system and the optimized input values to the system after optimization thereof, wherein a change in the select one of the unmeasurable outputs is not accounted for in the control input device.

5. (Previously Presented): The method of Claim 13, wherein the step of optimizing is further operable to receive constraints on the input values such that the optimization operation changes the inputs within the constraints when minimizing the error between the predicted and desired values.

5 6. (Previously Presented): The method of Claim 13, wherein the system is subject to at least one disturbance variable that alters the operation of the system and wherein the predictive model will predict the behavior of the selected aspects modeled thereby in response to changes in the at least one disturbance variable and the step of optimizing will change the inputs to again minimize the error between the predicted and desired values.

7. (Previously Presented): The controller of Claim 1, wherein said external predictive model comprises a linear model.

8. (Previously Presented): The controller of Claim 1, wherein the unmeasurable output comprises a product that is fabricated by the system.

9. (Previously Presented): The controller of Claim 1, wherein said optimizer is not operable to utilize said external predictive model during the operation thereof for the purpose of prediction therewith.

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10. (Previously Presented): The method of Claim 13, wherein the external predictive model comprises a linear model.

11. (Previously Presented): The method of Claim 13, wherein the unmeasurable output comprises a product that is fabricated by the system.

12. (Previously Presented): The method of Claim 13, wherein the step of optimizing is not operable to utilize the external predictive model during the operation thereof for the purpose of prediction therewith.

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